REMARKS

Claim 1 has been amended with similar limitations to dependent claim 5 and that the second lateral range is a largest of the scanning of the 3D volume. Similar amendments are made to claim 11. Figures 3a and 3b show the largest lateral range of the scanning in 3D being less than the lateral range of the 2D scan. No new matter is added.

Claim 18 has been amended with the limitations of claim 23.

Claims 1-17 were rejected pursuant to 35 U.S.C. § 103(a) as unpatentable over Robinson, et al. (U.S. Patent No. 6,582,367) in view of Hossack, et al. (U.S. Patent No. 5,873,830). Claims 18-29 were rejected pursuant to 35 U.S.C. § 103(a) as unpatentable over Robinson, et al. in view of Hossack, et al., and further in view of Smith, et al. (U.S. Patent No. 6,241,675).

Applicants respectfully request reconsideration of the rejections of claims 1-29, including independent claims 1, 11, 18 and 27.

Independent claim 1 recites scanning a two-dimensional plane over a first lateral range and scanning a three-dimensional volume over a second lateral range less than the first lateral range. Robinson, et al. and Hossack, et al. do not disclose these limitations.

As noted by the Examiner (page 3 of the Office Action dated October 15, 2007), Robinson, et al. do not disclose different lateral ranges for the 2D and 3D scans.

In response, the Examiner agrees that Robinson, et al. do not explicitly disclose different lateral ranges but now alleges that the 2D and 3D scans have different lateral regions, citing to the 2D scan plane having a larger lateral range than the front portion of the 3D scan.

Robinson, et al. do not show different 2D and 3D lateral ranges. The 2D image 402 is a cross-section of the 3D volume 400 (see 402 also labeled in the volume of Fig. 11). The 2D image and the 3D volume have identical lateral ranges.

The 3D volume 400 is six-sided as shown. A single face may be smaller than the image region 402. However, the lateral range of the volume, not a portion of the volume, is claimed. The face is only a sub-set of the volume. The lateral range of the volume and the 2D image are the same.

In the Advisory Action, the Examiner noted that the lateral range does not have to be the "largest lateral range." Claim 1 has been amended to indicate that the largest lateral range for

the 3D scan is less than the lateral range for the 2D scan. The 3D volume of Robinson, et al. has a largest lateral range that is equal to the 2D scan, not less than the 2D scan.

Hossack, et al. also do not disclose different lateral ranges for 2D and 3D or even different scan types. Hossack, et al. improve spatial characteristics within a region of an image (col. 2, lines 31-34; and col. 5, lines 40-53). A same 2D plane corresponding to the images is divided into two portions shown together as an image of the 2D plane (col. 2, lines 35-44; and col. 5, lines 54-65). Hossack, et al. change parameters within a same 2D plane, not different lateral extent for scans of different types, namely 2D and 3D.

In the Advisory Action, the Examiner relied on Robinson, et al. to teach the different lateral ranges. As indicated above, Robinson, et al. do not teach that the largest lateral range of the 3D scanning is less than the lateral range of the 2D scanning.

Claim 1 also recites that the lateral extents are within the 2D plane. Within the 2D plane 402, Robinson, et al. provide the same 2D and 3D lateral extent.

Claim 1 also recites a two-dimensional image representing a larger lateral extent than represented by three-dimensional representation. Robinson, et al. generate a 3D image 400 and a 2D image 402 (Figure 11). The entire volume is used to generate the 3D image 400. Accordingly, the 3D image 400 represents the same size or larger lateral extent than represented by the 2D image 402. One given face of the six-sided 3D scan region may be smaller, but rendering a 3D representation uses more than one given face of the 3D scan region. The volume is used to render. Robinson, et al. do not disclose a two-dimensional image representing a larger lateral extent than represented by a three-dimensional representation.

Independent claim 11 recites similar limitations, so is allowable for the same reasons.

Dependent claims 2-4, 6-10, 12, and 14-17 depend from claims 1 and 11, so are allowable for the same reasons. Further limitations patentably distinguish from the cited references.

Claim 4 recites a perpendicular lateral range. Hossack, et al. do not disclose different ranges for different scan types (2D and 3D).

Claims 6 and 14 recite 2D B-mode and 3D Doppler. The cited portion of Robinson, et al. describes tissue and vasculature. Vasculature is a tissue structure. Since the 3D scan is used to survey, there is no Doppler 3D.

Claim 8 recites two scans with different values for a parameter in addition to lateral extent. Hossack, et al. show different parameter values for different portions of a same image, not different images and not different types of scans. A person or ordinary skill would have used the different values for different portions of the 2D images, but would not have used the different values for the different types of scans.

Claims 9, 10 and 16 are allowable for the same reasons as claim 8.

Independent claim 18 recites scanning a volume at a lower resolution and scanning as sub-volume of the volume at a higher resolution. The combination of teachings of Robinson et al., Hossack, et al., and Smith, et al. would not have provided these limitations.

If Smith et al. were used with Robinson, et al. and Hossack, et al., the resolution of the sub-volume would not be different. Hossack, et al. teach spatial and temporal variation (col. 2, line 30 – col. 3, line s 26). Smith, et al. note temporal speed (col. 2, lines 1-3). A person of ordinary skill in the art would have used the parameter adjustments of Hossack, et al. for speed. Hossack, et al. use inter-frame interpolation, differences in persistence, and increasing relative frame rate (col. 2, lines 66 – col. 3, line 26). A person of ordinary skill in the art would not have used a different resolution since Smith, et al. note speed and Hossack, et al. increase speed without increasing resolution.

The Examiner points out that Smith, et al. teach targeting a sub-volume, and that it would have been obvious to use higher resolution in the sub-volume. However, Smith, et al. scan for velocity determination. Velocity imaging is low resolution. Velocity imaging does not show fine anatomical detail. A person of ordinary skill would not have increased resolution for a sub-volume since the velocity sub-volume of Smith, et al. would not benefit.

There is no teaching to use higher sub-volume resolution. The allegations of obviousness based on specific procedure use hindsight reasoning.

In the Advisory Action, the Examiner alleges that Smith, et al. disclose scanning within the sub-volume at a higher resolution. However, Smith, et al. scan the sub-volume without indicating higher resolution in the sub-volume scan. The sub-volume is not scanned with a higher resolution. Basically, Smith, et al. acquires color flow information for the sub-volume. Smith, et al. target a sub-volume for color flow, not for greater resolution.

Claim 18 also recites generating two 3D representations. None of the cited references show 3D representations for both the volume and sub-volume.

Independent claim 27 is allowable for the same reasons as claim 18.

Dependent claims 19-16 and 28-29 depend form claims 18 and 27, so are allowable for the same reasons. Further limitations patentably distinguish from the cited references.

Claims 20-22 are allowable for the same reasons as claim 1.

CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof.

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